Römisch-Germanisches Zentralmuseum
Forschungsinstitut für Archäologie

SONDERDRUCK AUS:

RGZM – TAGUNGEN
Band 17

Bendeguz Tobias (Hrsg.)

DIE ARCHÄOLOGIE DER FRÜHEN UNGARN

CHRONOLOGIE, TECHNOLOGIE UND METHODIK

Internationaler Workshop des Archäologischen Instituts
der Ungarischen Akademie der Wissenschaften
und des Römisch-Germanischen Zentralmuseums Mainz
in Budapest am 4. und 5. Dezember 2009

Verlag des Römisch-Germanischen Zentralmuseums Mainz 2012

Redaktion: Evelyn Garvey (New York);
Reinhard Köster, Bendeguz Tobias (RGZM)
Satz: Hans Jung (RGZM)
Umschlaggestaltung: Reinhard Köster (RGZM)

**Bibliografische Information
der Deutschen Nationalbibliothek**

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über **http://dnb.d-nb.de** abrufbar.

ISBN 978-3-88467-205-1
ISSN 1862-4812

Herstellung: Strauss GmbH, Mörlenbach
Printed in Germany.

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ADAM BOLLÓK

CHRONOLOGICAL QUESTIONS OF THE HUNGARIAN CONQUEST PERIOD: A TECHNOLOGICAL PERSPECTIVE

A few years ago, when I was working on my M. A. thesis[1], I had the idea of introducing an old new dating method in the archaeological research of the Hungarian Conquest Period. I have to admit that I was slightly envious of my colleagues who worked with the Avar material, to whom the manufacturing techniques of pressed sheet metal and cast belt mounts were all chronological attributes[2], and even the technical differences between cast belt mounts played a role in the elaboration of the Avar »Stufenchronologie« system[3]. Even though I was aware of the fact that the 10th century belt mounts of the Carpathian Basin formed a fairly homogenous group in terms of their manufacturing technique, I nonetheless enthusiastically began with the personal examination of the corpus of finds, hoping that I would discover similar attributes in the casting procedure or the attachment modes, which would enable the creation of a »Stufengliederung« resembling the system used in the Avar studies.

At about the same time (in 2006), I started the required museum internship in the Conquest Period Collection of the Hungarian National Museum under the guidance of Dr. László Révész. I am grateful for my good luck and to Mr. Révész that I had the chance to familiarise myself with the 10th century finds of the Carpathian Basin while I was still a student. The personal study of one of the most magnificent Hungarian Conquest Period collections, continuously enlarged since 1834[4], provided an excellent overview of the full range of the period's artefacts. The research project »Die frühen Ungarn und das ›Deutsche Reich‹ vom 9. bis zum 11. Jahrhundert« launched by Falko Daim and the *peregrinatio* required by this project meant the acquaintance with yet another superb collection, providing a great cross section of the 10th century grave finds of the Conquest Period[5]. I focused on the manufacturing techniques of this material with the same keen attention in the hope that it would perhaps provide a few anchors for settling oft-debated chronological issues. This short study aims at sharing the experiences gained from this work.

Artefacts made of organic material rarely survive under the climatic conditions of the Carpathian Basin[6], and thus I focused on the examination of artefacts made of inorganic materials, primarily of ferrous and non-ferrous metals. I will not discuss the pottery finds and the beads recovered from burials: the former has been adequately dealt with by Miklós Takács[7], while bead studies have become a highly specialised field of research in Europe during the past decades – one which is inconceivable without various archaeometric analyses[8].

Let me begin with the objects manufactured from non-ferrous metals. Concerning the investigated objects, three main procedures were used in manufacturing articles from non-ferrous and precious metals: pressing, casting and the hammering of sheet metal combined with the extensive use of punching. Interestingly enough, each artefact type was made using one of these procedures, and there are relatively few types which occur both in the cast and pressed variety or in the cast and hammered/punched variety.

The by far most widespread manufacturing technique was casting, used for making belt, weapon and purse mounts, harness ornaments, various buttons, mounts adorning women's headdresses and boots, the so-called caftan mounts, as well as lozenge-shaped mounts and pendant ornaments. Pressed mounts appear to have been less popular and were mostly used for adorning headdresses or trimming the neck-

line and hemline of dresses[9]. I only know of a single pair of pressed braid ornaments[10]. This is hardly surprising in view of the durability and wearability of articles made using these two techniques. Still, it is not self-evident that only one single pressed belt set is known from the entire corpus of the 10th century finds[11] and that the number of pressed shift ornament sets is no more than fifteen to twenty[12]. What is nonetheless striking is that with the exception of a few partially or fully gilded pieces, none of the pressed artefacts examined to date showed traces of subsequent work. Unlike the contemporary Viking material[13], none of the mounts was enhanced by adding granulation or filigree. There is not one shred of evidence that these artefacts, whose average thickness is 0.01 cm, were provided with a lead[14] or wax core[15], even though their fragility would undoubtedly have justified a procedure of this type[16]. The simplest procedure was chosen for attaching these pressed articles: they were sewn onto cloth or leather by means of holes punched along the edges[17]. The pressed artefacts examined by me or known to me from various publications were produced with the same technique, and thus they can hardly be grouped according to their manufacturing or attachment technique.

Returning to the cast artefacts, the overall picture is not particularly more detailed. Most of the 10th century pieces from the Carpathian Basin are simple items cast in one piece. The simple earrings, rings, neckrings and bracelets found among the grave goods of the large row-grave cemeteries were either cast in one piece or were pieces twisted from two or three strands of wire. They were most likely cast using the *cire perdue* technique or by making a mould of sand into which the pattern was pressed – this issue remains open until the exact casting technique is reconstructed by means of experimental archaeology[18]. In contrast, the mounts adorning the costume, the belt, the weapons and the horse harness of the elite were manufactured using a slightly different technology, which can be best described as »thin casting«, a procedure resembling or being a variant of the *cire perdue* technique[19]. The craftsman first pressed the model of the artefact to be made into the lower part of a clay mould:

> »The wax would probably have been poured in, and then quickly poured out, once a layer had been deposited on the surface of the mould, but molten wax would then have been brushed over the surface of the impression in thin layers, until the suitable thickness had been achieved«[20].

The upper part of the clay mould was produced by pressing it into the previously made lower part; the two parts were then fitted together. The craftsman shaped the cylindrical hollow for pouring in the metal and allowed the form to dry; he then encased the whole form with a layer of clay and burnt it before the actual casting process began[21].

The above-described technique of »thin casting«[22] enabled the goldsmiths working for the ancient Hungarians to manufacture those strikingly thin casts (with an average thickness of 0.1 cm) which are so familiar to all researchers investigating the 10th century archaeological heritage of the Carpathian Basin[23]. Nevertheless, the technique alone can hardly explain this phenomenon; the special alloys contributed significantly too, since the singular alloy types used in the 10th century with their extraordinarily low melting point and their particular fluidity facilitated that the metal poured in the mould would fill the inner space down to the last detail[24].

In the case of the cast artefacts, most of the available evidence regarding manufacturing techniques has been preserved on the reverse side. Through macroscopic investigations, seven formal types could be established[25]:

1. The back side is entirely smooth, no raised border exists. The ornamentation on the front side is not displayed on the back side.
2. The back side is smooth and has a low (and often asymmetrical) raised border around the edge. The ornamentation on the front side is not displayed on the back side.
3. The back side is smooth and has a low (and often asymmetrical) raised border around the edge. The ornamentation on the front side is displayed as a negative relief on the back side.

4. The back side is curved, no raised border exists. The ornamentation on the front side is not displayed on the back side.
5. The back side is curved, no raised border exists. The ornamentation on the front side is displayed as a negative relief on the back side.
6. The back side is curved and has a low (and often asymmetrical) raised border around the edge. The ornamentation on the front side is not displayed on the back side.
7. The back side is curved and has a low (and often asymmetrical) raised border around the edge. The ornamentation on the front side is displayed as a negative relief on the back side.

These types defined by three attributes were all produced by using the same casting technique, i. e. »thin casting«; the differences originate from the slightly varying forms of the wax models used[26]. The curved or plane nature of the back side depends mostly on the planeness or curvedness of the front side of the master form and on the height/thickness of it, since a low/thin and plane master form pressed into the clay leaves only a very shallow depression which is completely filled out by the molten wax poured in, and, conversely, a high/thick master form results in a relatively deep depression on whose surface the wax constitutes a thin layer following the original curve of the depression, but it does not fill it out completely. The mere existence and quality of the edges are clear consequences of the process of pouring the wax into and out of a relatively deep depression. The appearance of the negative reliefs on the back sides is also an outcome of the elaboration of the master form and the thickness of the wax model[27].

Let us now direct our attention to the attachment methods used on the cast artefacts. Most of these objects were attached to a cloth or leather backing by rivets or small lugs. The elements used in the two attachment methods were created in the same procedure. Both the round rods and the rectangular sectioned elements intended for the lugs were cast in one with the object to be attached. The rod for the lug was bent back to create the loop through which the cord used for the attachment could be threaded[28] while the rivets were either hammered at 2-4 mm or simply bent back after they were passed through the cloth or leather. Small back plates used for ensuring a secure attachment can sometimes be made out on the hammered rivets[29]. If the rivets were damaged during casting, attachment or wear, the damaged ones were not replaced by soldering other rivets; instead, the mount was perforated and sewn onto the backing[30] or, after perforating a mouth, a small copper rod was placed in the hole, whose end was hammered into the surface of the object's front side, hereby fastening the rod to the mount[31]. This generally happened if a small stub instead of the actual rivet was made during casting, or if the rivet broke off for some reason. A third attachment method strongly resembles the above-described lugs. In these cases, however, two or three small rectangular slabs with a hollow in their midst are cast with the mount. The threads used for fastening the object were stitched through these hollows.

The examined finds did not include pieces indicating a cast-on rim hole (»angegossener Riemendurchzug«) or a casing attachment method. The trapezoidal buckles[32] and the two strap-ends[33] attached by cast-on rim holes were southern imports in the Carpathian Basin. The only 10th century casts manufactured in the Carpathian Basin on which the latter attachment method was widely used are the lyre-shaped belt buckles[34]. However, this fastening variety was widespread in the 9th-12th centuries from China to the Mediterranean region[35].

The remarks concerning the decoration of pressed mounts more or less also holds true for the cast mounts. Filigree and granulation are entirely lacking; aside from the removal of the casting skin (»Gusshaut«) and the polishing of the front side of the cast artefact, the mount was at the most partially or wholly coated. Fire gilding was the procedure that was most often applied[36]; tinning was less frequent and rarely noted in the description of the artefacts under survey[37]. The mounts were sometimes adorned with glass inlay[38], although a structure resembling a genuine cell was rarely formed. As far as can be established from the

glass pieces which often fell out of their original setting, they were simply hammered into place along the edges of the small perforations made for them. While it is possible that the area of the glass inlay was coated with some sort of glue, there is no evidence for this practice. The same holds true for glass-inlaid mounts with a fairly improvised setting: in the lack of archaeometric analyses, we may at the most assume the use of some sort of glue in the case of glass-inlaid rings and bracelets with glass-inlaid collets[39].

The last major category among artefacts made of non-ferrous and precious metals are the objects made by hammering. Nándor Fettich, an accomplished goldsmith, described at length how these artefacts were manufactured[40]. What is important in this respect is that while these hammered artefacts decorated with engraving and *repoussé* technique differ only little regarding their manufacturing technique, major differences can be noticed regarding their quality – they range from simple engraved[41] or patchily punched ornamentation[42] to elaborate, finely punched designs[43]. The single genuine difference is perhaps the effort to create the illusion of depth by means of the *repoussé* technique, as opposed to two-dimensional metalwork[44]. However, with the exception of one early attempt essentially based on the chronological sequence of forms[45], there has been no study confirming that this technical element can be explained by chronological differences.

It seems revealing to examine two other technical traits whose closer study might contribute to constructing a more precise chronological framework. One of them is actually the lack of something. As mentioned before, granulation and filigree as decorative techniques on metalwork were not widely used by the goldsmiths of the 10th century in the Carpathian Basin. This is all the more intriguing because, even though most of the objects decorated with granulation can be seen as mass-produced items of a Balkan-Byzantine circle[46] and thus be regarded as imports[47], this can be hardly claimed for all of the objects. We cannot deny the possibility that objects of this type were also produced by local goldsmiths or foreign craftsmen arriving in the Carpathian Basin. It must also be borne in mind that ornamental techniques imitating a particular decoration with the aim of producing a like visual effect are not infrequent in the find material. This includes cast bead-row frames and semi-globular ornamental elements created with *repoussé* technique or during pressing. The very existence of these pseudo-granulation techniques[48] implies that there was probably an earlier group of artefacts which was copied using the available technical repertoire in order to reproduce the desired visual effects. Even though one can hardly claim with certainty that the pseudo-granulation on the examined artefacts imitates genuine granulation, the original model(s) must nonetheless have been (an) object(s) adorned with granulation, even if the »translation« of this decorative form into another technique occurred in regions south of the Carpathian Basin.

The closer examination of another decorative technique, namely metal inlay, can perhaps yield even better results. No more than a handful of metal-inlaid objects are known from the eastern European steppe regions where the ancient Hungarians lived prior to their arrival in the Carpathian Basin[49]. Interestingly enough, the 10th century material comprises several metal-inlaid stirrups[50] and a few sabre guards, as well as a couple of metal-inlaid iron bits[51] and a buckle adorned in this manner from Geszteréd-Kecskelátó dűlő (Szabolcs-Szatmár-Bereg county/H)[52]. It is unclear from where the cultural impacts stimulating the adoption of this technical »novelty« by the ancient Hungarians came – in fact, this question has not even been raised in Conquest Period studies until now. There are several possible answers. The first possibility is that this technology was mediated by the Viking goldsmiths active in the workshops in the Kiev region towards the end of the 9th century[53], the second one that it was adopted from the 8th century late Avar[54] or the 9th century Carolingian tradition (although it must in all fairness be admitted that there is no evidence whatsoever for this), and finally, we may assume a 10th century »western« or southern influence. In the latter case, the »western« imported swords and/or the weapons brought home as part of the booty from raids may have contributed to the taste for objects decorated in this manner among the ancient Hungarians[55]. The above

is no more than educated guesswork because no X-ray pictures have been made of the 10th century metal-inlaid artefacts from the Carpathian Basin[56], and thus a minute reconstruction of how they were made is virtually impossible, which is all the more regrettable because a study along these lines might well provide chronological anchors. If »western« metal-inlaid swords had indeed played a prominent role in the spread of this style and the subsequent adoption of the decorative technique in the Carpathian Basin, the swords dated to the later 10th century until now would by necessity be used for dating the stirrups, some of which were assigned to the earlier 10th century, or, conversely, the stirrups would call for an earlier dating of the appearance of these swords to the earlier 10th century[57]. A detailed comparison of manufacturing techniques holds out the promise of some very interesting results.

Speaking of iron artefacts, it might be instructive to briefly review the manufacturing techniques of different horse bit types[58]. The following differences could be noted in the case of wrought iron bits. The mouth piece of the 10th century bits from the Carpathian Basin was generally fashioned from two iron rods, with one or two loops created at either end. The loops were either made by bending back the end of the iron rod, or by creating a perforation by means of a pointed implement driven through the two ends of the rod. In the case of the bent-back rods, the bent sections were either identical at either end or perpendicular to each other. The creation of the rings followed a uniform procedure: a rectangular sectioned iron sheet was bent into a ring shape, and the two ends folded onto each other were then forged into one. The manufacturing of the side bars also followed the same procedure: the usually D-shaped loops were attached by means of two perforations, most often through the middle of the side bar: the ends of the D-shaped loop were positioned in the perforation and were hammered after turning them in different directions. Even though fairly coherent groups can be distinguished based on the similarities and dissimilarities, the contextualisation of these groups is not adequate. The identification of identical or different blacksmiths, chronological and/or regional groups would be theoretically possible; however, the low number of pieces found together with coins and the high number of corroded pieces unsuitable for technical observations currently only enable the identification of the rough outlines of these groups, but not their interpretation. It also calls attention to the fact that answers to these questions can only be hoped for from the full publication of excavated assemblages and from the inclusion of technical details of this kind in the descriptions of the artefacts.

The foregoing clearly illustrates the difficulties in dating 10th century find assemblages from the Carpathian Basin based in part on manufacturing techniques. Aside from the frequent lack of necessary data in the publications, the nature of the archaeological material itself is also a serious obstacle. Most of the artefacts in question were made using the same technique; variability was not an issue among the craftsmen producing them. Moreover, and more strikingly, variability and technical skilfulness happen to hardly play any role in expressing social status among the inhabitants of the 10th century Carpathian Basin. This is amply illustrated if one directs their attention to the wealthiest grave assemblages of the period. Grave II/52 at Karos (Borsod-Abaúj-Zemplén county/H) or the Zemplín grave (Hung. Zemplén; Trebišov dist./SK) contain some hundred silver-gilt objects, but – as far as the manufacturing techniques are concerned – these items are of the same quality and manufacturing methods than pieces which came to light from more modest 10th century graves[59]. The same holds true for grave assemblages including elaborately made gold objects, e. g. from the Geszteréd grave or grave A from the Rakamaz-Strázsadomb cemetery (both Szabolcs-Szatmár-Bereg county/H)[60]. These finds are made of relatively pure gold and are elaborately executed, but the manufacturing techniques applied by the goldsmith(s) creating them are the same as those widespread among less able artisans who worked for the lower classes.

Far be it from me to suggest that technical studies have no future in Conquest Period studies. On the contrary, the broad overview given above was meant to illustrate that studies in this field must by all means be

continued. Previous work was hindered exactly because smaller technical details were not specified in the available publications and thus researchers had to personally familiarise themselves with the entire material – a virtually impossible undertaking. It should also be clear from the foregoing that we can hardly expect to identify major differences in the manufacturing techniques enabling the separation of well-defined groups, especially if we have to rely on drawings rather than on photographs and detailed descriptions of this material. It must also be borne in mind that there is no guarantee whatsoever that even the most minute examination of the artefacts in question will yield spectacular results. Most of these artefacts are made of one or two elements, and the technical repertoire used for their manufacturing was rather limited. It is unlikely – although not impossible – that a distinction between drawn and twisted wires might be of help in dating the artefacts and grave assemblages containing artefacts of this type. However, we can hardly claim that a technological approach is useless before even attempting to map the differences in the manufacturing techniques within a burial ground or a smaller region. As Gabriel Fusek clearly demonstrated in this volume: any advance can only be hoped for from the minute examination of certain phenomena within a cemetery, and any findings in this field can only be generalised and extended to the entire Carpathian Basin as a broad tendency at best[61]. Fully excavated cemeteries are a prerequisite for any studies in this field and, obviously, these burial grounds should preferably have a high number of richly furnished burials enabling to identify contemporaneous interrelations and differences reflecting the changes over time, as well as their contextualisation. In the future, archaeogenetical studies may provide good anchors for determining the relative chronology of the burials in a particular burial ground, i. e. for identifying the temporal differences between the grave assemblages and how changes in the material culture are reflected. Until these costly excavations and analyses are conducted, the single option left is to pinpoint the similarities and differences through the identification of minute details, using the traditional techniques available to archaeology, e. g. the separation of cast artefacts modelled after the same archetype[62] and pressed mounts made using the same die, enabling the chronological association of individual finds. Similarities of this type can be identified both within one particular cemetery and within a group of cemeteries. Some of the possible roads to advances are given; however, studies in this field have only just begun, and some time may elapse before the difficulties encountered are overcome. The identification and interpretation of individual technical elements can only yield meaningful results when examining a large numbers of artefacts; isolated work by one or two scholars will hardly be sufficient.

Notes

1) Bollók 2007; for some results see Bollók forthcoming.

2) The *loci classici* in this respect are Csallány 1939; Kovrig 1963.

3) cf. Daim 1987.

4) On the history of the Conquest Period Collection in the Hungarian National Museum see Révész 2002.

5) The main aim of our small team (Ádám Bíró, Ádám Bollók and Péter Langó) was to collect, describe and photograph all available grave assemblages containing 9th-10th century coins minted outside the Carpathian Basin on the one hand and 10th-11th century swords on the other. Within the scope of this project we managed to personally examine the relevant 9th-11th century finds preserved in the following archaeological collections: Déri Múzeum (Debrecen/H), Rippl-Rónai Múzeum (Kaposvár/H), Savaria Múzeum (Szombathely/H), Móra Ferenc Múzeum (Szeged/H), Herman Ottó Múzeum (Miskolc/H), Koszta József Múzeum (Szentes/H), Rétközi Múzeum (Kisvárda/H), Szent István Király Múzeum (Székesfehérvár/H), Xántus János Múzeum (Győr/H), Wosinsky Mór Megyei Múzeum (Szekszárd/H), Laczkó Dezső Múzeum (Veszprém/H), Katona József Múzeum (Kecskemét/H), Magyar Nemzeti Múzeum (Hungarian National Museum, Budapest/H), Budapesti Történeti Múzeum (Budapest/H), Jósa András Múzeum (Nyíregyháza/H), Stredoslovenské múzeum (Banská Bystrica/SK), Slovenské pol'nohospodárske múzeum (Nitra/SK), Archeologiceský Ústav SAV (Nitra/SK), Hornonitrianske múzeum (Prievidza/SK), Múzeum mincí a medailí (Kremnica/SK), Východoslovenské múzeum (Košice/SK), Hradné múzeum (Fil'akovo/SK), Vlastivedné múzeum (Galanta/SK), Vlastivedné múzeum (Hlohovec/SK), Slovenské národné múzeum (Bratislava/SK). We are indebted to all of our colleagues and to all of the institutions who/which gave permission to examine the needed material and who/which helped us on many occasions and in various phases of the project.

6) Most of the known exceptions are made of antler, including ornamented plaques attached to saddles, bow plates attached to grips and limbs (Bíró forthcoming), stiffening plaques fastened to leather bowcases (László 1955), mouth plates of quivers (Straub 1999), sabre handles (grave 51 at Szob-Vendelin [Pest county/H]; Fodor et al. 1996, 410 fig. 1; grave 183 at Trnovec nad Váhom [Hung. Tornóc; Šaľa/SK]; Točik 1971, pl. 29, 1) and knife handles, sidebars of horse bits, staff ends, and a strap end (Fodor et al. 1996, 313 fig. 2). Of course, a number of textile and leather finds are also preserved; however, their occurrence is rather an exception than the rule (on the textile remnants see Bollók et al. 2009; Nagy et al. 2010b). Unfortunately, a similar recent overview does not exist as regards leather finds (for a summary of the previous literature see Petényi 2010, 117-148).

7) See Miklós Takács's contribution in this volume.

8) The previous research conducted on 10th-12th-century bead finds of the Carpathian Basin (first and foremost by Katalin Szilágyi) was mainly of a typological in nature, (cf. Szilágyi 1987; 1990; 1994; 1997). Research on the Avar chronology is much more developed in this field, too (cf. Pásztor 1996; 2008; Fórizs et al. 1999; 2000a; 2000b; 2001; Nagy et al. 2010a). For a fairly modern methodology, see the collected studies in: von Freeden / Wierczorek 1997.

9) For two slightly overlapping collections of pressed mounts see Bálint 1991, 262 pl. 44, 5; A. Kiss 1987, 131f.; the golden pieces have been gathered by Révész 2001, 30-32, the gold-pressed lozenge-shaped ornaments by Langó 2000, 302 f.

10) Malé Kosihy (Hung. Ipolykiskeszi; Nové Zámky dist./SK) grave 104 (Hanuliak 1994, 122 pl. 23, 7-8). Judging only from the published photo (Fodor et al. 1996, 352 fig. 1), the same may hold true for the braid ornament from Solt-Tételhegy (Bács-Kiskun county/H), however, this piece requires a personal investigation.

11) Kétpó (Jász-Nagykun-Szolnok county/H; Selmeczi 1980, 253-255 figs 2-4; Fodor et al. 1996, 238 fig. 4).

12) e. g. grave 3 at Pilin-Leshegy (Nógrád county/H; Nyáry 1873, 22); Tiszanána-Cseh Tanya (Heves county/H; Révész 2008, pl. 79, 11) and the short list gathered by P. Langó as in note 9.

13) Capelle / Vierck 1971, 111.

14) That was a standard working procedure in the early Avar period.

15) Previously L. Révész (2001, 27) called attention to the possible but up to now hardly documented usage of wax or resin cores. This question can only be clarified by future archaeological observations and archaeometric analysis.

16) The only available observation which could support such a thesis was made by Csanád Bálint, according to whom small leather pieces were found inside the pressed mounts in grave 12 at Szabaskígyós-Pálligeti tábla (cf. Bálint 1971, 70).

17) See, however, L. Révész's (2001, 27) suggestion, according to which it cannot be entirely ruled out that the textile or leather strips on which some cast lozenge-shaped collar mounts were sawn could have strengthened these fragile pressed mounts, too. For the cited attachment techniques see the exceptionally well-preserved examples published by Kőhegyi / Knotik 1982; Révész 2007, 312 fig. 15; cf. also Kürti 1996, 150; Révész 2001, 27.

18) For an exemplary reconstruction of the casting technique of Late Avar belt sets, see Bíró / Szenthe 2011.

19) In contrast to Emil Szegedy's opinion who excluded the possibility of using the lost wax technique (Szegedy 1960, 318).

20) Coatsworth / Pinder 2002, 80.

21) For the reconstruction of the »thin casting« technique (discussed on Anglo-Saxon examples) see ibidem 80-82 pl. 11; the similarity between the end products of the Anglo-Saxon »thin casting« and the 10th century Hungarian mounts has been stressed by Bühler 2006, 177.

22) Recently an interesting lead mould intended to produce wax models was published from the region of Preslav (prov. Šumen/BG). After the wax in the lead mould had hardened, it was removed from the mould, and a two-part clay mould was built around it (cf. Dončeva/Nikolov 2010); nothing comparable, however, is known up to now from the Carpathian Basin.

23) In my view it is very telling that among the contemporary Viking casts those whose average thickness is 0.3 cm are mentioned as exceptionally thin (cf. Arrhenius 1975, 96 fig. 2); T. Capelle (Capelle / Vierck 1971, 95) refers to the 0.3-0.4 cm thick objects as »dünnwandige Endprodukte«, too.

24) cf. the findings presented by Susanne Greiff in this volume.

25) Since only the smallest part of the available publications also display the back sides of the mounts (e. g. Fettich 1937; Kiss 1938, pl. 5; Írásné Melis 1992, 100 f. figs 9. 11; Bühler 2006), the following classification goes back to information acquired during the aforesaid personal investigations.

26) Already Emil Szegedy tried to explain this peculiarity in his pioneering article. Szegedy's point of departure was, however, inaccurate: he assumed the appearance of the front side's ornamentation as a negative relief on the back side to be the outcome of a subsequent working after casting. Since due to minute investigations conducted on a couple of mounts he was able to exclude a supplementary pressing of the objects after casting as well as a subsequent chiselling of the ornament into the cast, he tended to guess that the procedure was hammering (cf. Szegedy 1960, 318). Now it is, in contrast, beyond any doubt that this negative relief was already present on the lost wax model.

27) I am grateful to Gergely Szenthe (Budapest, Hungarian National Museum) for his kind advice and comments. He is, of course, in no way responsible for any errors.

28) Kürti 1996.

29) Although more than half of the investigated mounts have lost their small back plates, up to now – as far as I know – only one single study mentioned that the perishing of the back plates happened during the process of restoration (Írásné Melis 1992, 100-102).

30) c.f., e. g., grave II/50 at Kenézlő-Fazekaszug and grave II/61 at Karos-Eperjesszög (both Borsod-Abaúj-Zemplén county/H; Révész 1996, 102 pl. 32); the same phenomenon has been noted for the Budaörs-Tűzköhegy (Pest county/H) bronze belt mount (Írásné Melis 1992, 102); however, this »method« was also used in instances where no hints of damages can be revealed on the existing rivets – see, e. g., the belt mounts from grave 1 at Sárrétudvari-Poroshalom (Hajdú-Bihar county/H; Fodor et al. 1996, 278 fig. 3).

31) cf., e. g., grave II/61 at Karos-Eperjesszög (Borsod-Abaúj-Zemplén county/H), belt buckle (Révész 1996, 102 pl. 1); Ladánybene-Benepuszta (Bács-Kiskun county/H), horse harness mount(?) (Hungarian National Museum, Budapest, inv. no. 9/1846.2); Szolnok-Strázsahalom (Jász-Nagykun-Szolnok county/H), silver belt mount (ibidem, inv. no. 58/1912.3); grave 2 at Streda nad Bodrogom (Hung. Bodrogszerdahely; Trebišov

dist./SK), silver-gilt mount (Nevizánsky/Košta 2009, pl. 15, 10); grave 2 at Tiszaeszlár-Újtelep (Szabolcs-Szatmár-Bereg county/H), silver belt mount (Hungarian National Museum, Budapest, inv. no. 6/1948.7).

32) For pieces known from the Carpathian Basin see Langó/Türk 2004, 421 pl. 2.

33) Grave 21 at Szolnok-Szanda, Beke Pál halma (Jász-Nagykun-Szolnok county/H; Madaras 2006, 234 fig. 20, 1); Ciumbrud (Alba county/RO; Dankanits/Ferenczi 1959, 608 fig. 3, 5).

34) On this buckle type see Révész 1987.

35) cf. Schulze-Dörrlamm 2009, 262-264.

36) This technique was widely used in late antiquity (from the 3rd century on) and the Early Middle Ages (cf. Anheuser 1999).

37) Nevertheless, it needs to be stressed that even if tinning was much rarer in the 10th century Carpathian Basin than in the preceding late Avar times (cf. Költő 1982) or among the various mount types known from present-day Bulgaria (most of which must originate from the 10th-11th centuries), personal investigations brought to light some previously published sets of mounts on which clear hints of tinning are preserved. I will only quote a couple of examples here, e. g. grave II/53 at Karos-Eperjesszög (Borsod-Abaúj-Zemplén county/H), horse harness mounts (Révész 1996, 92 pl. 1-37); grave 207 at Ártánd-Nagyfarkasdomb (Hajdú-Bihar county/H), horse harness mounts (Fodor et al. 1996, 214 figs 7-8); grave 3 at Tiszabezdéd-Harangláb dűlő (Szabolcs-Szatmár-Bereg county/H), belt mounts (Jósa 1896, 392 figs 2-7); grave 3 at Kecel (Bács-Kiskun county/H), belt mounts (Fettich 1937, pl. 118).

38) On the various mount types decorated with precious stones or glass inlays see Horváth 2004a; however, more often than not glass inlays were used for adorning finger-rings (Horváth 2004b) and bracelets (cf. Horváth 2006).

39) As far as I know, only one scholar observed and noted the usage of some sort of paste/glue in the previous literature (Horváth 2004b).

40) Fettich 1935; 1937.

41) Grave 3 at Kenézlő-Fazekaszug (Borsod-Abaúj-Zemplén county/H), sabretache plate (Fodor et al. 1996, 153 fig. 2).

42) e. g. a pair of braid ornaments from grave 1 at Dormánd-Hanyipuszta (Heves county/H; Révész 2008, pl. 22, 1-2; Fodor et al. 1996, 385 fig. 1).

43) e. g. silver-gilt sabre mounts in grave II/52 at Karos-Eperjesszög (Borsod-Abaúj-Zemplén county/H; Révész 1996, pl. 151; Fodor et al. 1996, 96 fig. 23; 97 fig. 25); gold sabre mount at Geszteréd-Kecskelátó dűlő (Szabolcs-Szatmár-Bereg county/H; Kiss 1938, pls 2-3; Fodor et al. 1996, 80 fig. 6); gold- and silver-gilt sabre mounts in grave A at Rakamaz-Strázsadomb (Szabolcs-Szatmár-Bereg county/H; Fodor et al. 1996, 114 figs 3-5).

44) e. g. the huge quality gap between the »flat« sabretache plate from grave 3 at Eperjeske (Szabolcs-Szatmár-Bereg county/H; Fodor et al. 1996, 73 fig. 2) and the elegant plate from grave A at Rakamaz-Strázsadomb (Fodor et al. 1996, 112 fig. 1).

45) Fettich 1937, 76. 224 f.

46) Mesterházy 1990; 1991.

47) At least if we accept the assumptions of Mesterházy 1993; nevertheless, this question requires a separate study.

48) Following the definition suggested by Wolters 1983.

49) However, most of these objects were manufactured centuries earlier than the Hungarians' arrival in the Carpathian Basin, cf. the 7th century metal-inlaid sword guard from Mala Pereščepino/UA (for a high quality photo see Komar 2008, 201), or in another geographical area, as a late 9th/early 10th century sabre quillon from the Caucasus (Mohamed 2007, 33). For the second reference I am indebted to Attila A. Türk.

50) One specific class of metal-inlaid stirrups was collected and evaluated by Horváth 2009; most of the well-preserved items are displayed in the catalogue of the exhibition »The Ancient Hungarians« (Fodor et al. 1996).

51) e. g. Muşca (Hung. Muszka; Alba county/RO; Fodor et al. 1996, 340 fig. 1); Tarcal (Borsod-Abaúj-Zemplén county/H; Fettich 1937, pl. 64.12).

52) Kiss 1938, pl. 8, 20.

53) For a case study on the ancient Hungarians' connections with this Kievan centre see Kovács 2003.

54) On late Avar metal-inlaid objects see Heinrich-Tamaska 2005.

55) For these swords see Kovács 1994-1995. The best preserved examples are displayed in the exhibition catalogue (Fodor et al. 1996).

56) Only a small portion of these finds (first and foremost imported swords) was investigated by this method, but unfortunately neither the X-ray pictures nor their interpretations were published up to now.

57) For a recent interpretation see Kovács 1990; 1994-1995; for revisiting the existing archaeological narrative see Ádám Bíró's contribution in this volume.

58) For a functional analysis of the different horse bit types see I. Dienes' classical study (Dienes 1966).

59) This issue will be more thoroughly dealt with in my forthcoming dissertation; for the Karos grave see Révész 1996, pls 78-90; for Zemplín see Fettich / Budinký-Krička 1973.

60) For Geszteréd see Kiss 1938; Fodor et al. 1996, 77-81; the Rakamaz-Strázsadomb cemetery has not been fully published yet; for the best available summary of the finds under review see Fodor et al. 1996, 110-119.

61) See his contribution in this volume and his forthcoming monography on the Nitra-Šindolka (Hung. Nyitra; Nitra dist./SK) cemetery. I am indebted to him for sharing his experience with me.

62) As for cast belt buckles and mounts, I tried to separate some sets modelled after the same archetype in my M.A.-thesis, but unfortunately most members of the given groups happened to be stray finds, which undermines all possible chronological implications of the results achieved (cf. Bollók 2007; forthcoming).

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Abstract / Zusammenfassung / Rezümé

Chronological questions of the Hungarian conquest period: a technological perspective

This short paper aims at examining the main manufacturing techniques employed by craftsmen working in the Carpathian Basin in the course of the 10th century. Since almost all available artefacts (except the huge series of ceramic vessels of the period) are metal finds, the focus is on the techniques used by goldsmiths, silversmiths and blacksmiths. The central question addressed in this brief overview is whether technical details can provide a few anchors for settling the oft-debated chronological issues regarding the various artefacts made from ferrous and non-ferrous metals during the 10th century. In this study, the main outlines of casting, the »Pressblech« technique and hammering and punching as well as the various attachment methods are sketched. Less attention is directed to less frequent procedures as, e. g., glass or metal inlays, granulation and filigree. In contrast to the last two techniques which seem to be alien features in the Carpathian Basin during the period under review, in the case of both inlay types more detailed technical examinations are required in order to understand their precise manufacturing methods and therefore their possible chronological implications. What is apparently evident after a series of personal investigations is that most of the artefacts in question were made using the same technique; variability was not an issue among the craftsmen producing them. This fact is a serious obstacle when dating the 10th century find assemblages from the Carpathian Basin based in part on manufacturing techniques. Be that as it may, the identification and interpretation of individual technical elements can only yield meaningful results when examining a large number of artefacts; isolated work by one or two scholars will hardly be sufficient. Hopefully, future research will shed some new light on chronologically relevant technical details.

Chronologische Fragen zur Archäologie der ungarischen Landnahmezeit: eine technologische Perspektive

Im Rahmen dieser kurzen Studie werden die herstellungstechnologischen Aspekte des frühungarischen Fundmaterials unter besonderer Berücksichtigung ihres chronologischen Werts analysiert. Da neben der Keramik v.a. Funde aus Edel- und Buntmetall oder aus Eisen den größten Anteil der materiellen Hinterlassenschaft im Karpatenbecken des 10. Jahrhunderts darstellen, stehen diese Objekte im Vordergrund. Es wird versucht, die wichtigsten Herstellungstechniken der Zeit, d. h. Guss, Pressblechtechnik und Hämmern/Punzieren, zu skizzieren. Einige Techniken, wie z. B. die Granulation und das Filigran, können hier nur am Rande gestreift werden, da diese im Karpatenbecken nur sehr sporadisch auftreten und vermutlich in den meisten Fällen Importgegenstände darstellen. Im Gegensatz dazu werden aber die verschiedenen Einlegetechniken (Edelstein- und Glasinkrustation, Tauschierung) viel ausführlicher besprochen. Da es bisher keine detaillierten naturwissenschaftlichen Untersuchungen gibt, die zum Vergleich notwendig wären, können nur vorläufige Ergebnisse präsentiert werden. Trotz des lückenhaften Forschungsstands ist anzunehmen, dass bei den frühen Ungarn eine herstellungstechnische Variabilität überhaupt nicht charakteristisch war. Diese Tatsache ist ein schwerwiegendes Hindernis bei der Beurteilung der chronologischen Stufengliederung des Fundmaterials des 10. Jahr-

hunderts anhand technologischer Merkmale. Man muss sich darüber im Klaren sein, dass die zukünftige Identifikation einiger interpretierbarer technischer Merkmale nur nach der Untersuchung einer großen Zahl von Einzelobjekten und Objektgruppen zu erwarten sein wird. Bisherige isolierte Arbeiten von einigen wenigen Forschern reichen dazu nicht aus. Es ist zu hoffen, dass zukünftige Detailuntersuchungen noch viele aus chronologischer Sicht interpretierbare technische Daten ans Tageslicht bringen werden.

A magyar honfoglalás korának régészeti kronológiájáról: készítéstechnikai perspektívák
Jelen rövid tanulmány fő célkitűzése a 10. századi Kárpát-medencében dolgozó mesterek által használt készítéstechnikai eljárások vizsgálata. Tekintettel arra, hogy a nagy szériákban ismert kerámialeletek mellett a korszak tárgyi hagyatékából főként fémtárgyak kerültek eddig napvilágra, dolgozatomban az ötvösök és kovácsok által alkalmazott előállítási technikák esetleges kronológiai értékét teszem vizsgálat tárgyává. Ennek keretében főként az öntéssel, préseléssel, illetve kalapálással-poncolással előállított emlékekre koncentrálok. Kevesebb teret szentelek a 10. századi Kárpát-medencében ritkábbnak számító üvegberakásnak, tausírozásnak, illetve a granulációnak és a filigránnak. Míg az utóbbi kettő esetében minden valószínűség szerint idegen eredetű jelenségekkel van dolgunk, addig a berakásos eljárások során használt készítés metódusok pontosabb megismerését, s ezáltal esetleges kronológiai értékük megállapítását a megfelelő természettudományos vizsgálatok hiánya hátráltatja. Az azonban már az eddig személyesen elvégzett vizsgálatsorozat alapján is nyilvánvaló, hogy a 10. századi Kárpát-medencében a készítéstechnikai variabilitás koránt sem volt jellemző. E tény komoly nehézség elé állít minden olyan próbálkozást, amely készítéstechnikai különbségek alapján kísérel meg kronológiai fogódzókat találni. Ugyanakkor azzal is tisztában kell lennünk, hogy kérdésfelvetésünk szempontjából esetlegesen használható technikai jellegzetességeket csak nagy szériákra kiterjedő szisztematikus kutatás során lesz esélyünk fellelni; egy-két magányos kutató elszigetelt munkája ehhez nem tűnik elégségesnek. Éppen ezért magam hiszem és remélem, hogy a jövő kutatása képes lesz ilyen kronológiailag is értelmezhető technikai elemeket találni a 10. századi leletanyagban.

AUS DEM VERLAGSPROGRAMM

Monographien des RGZM
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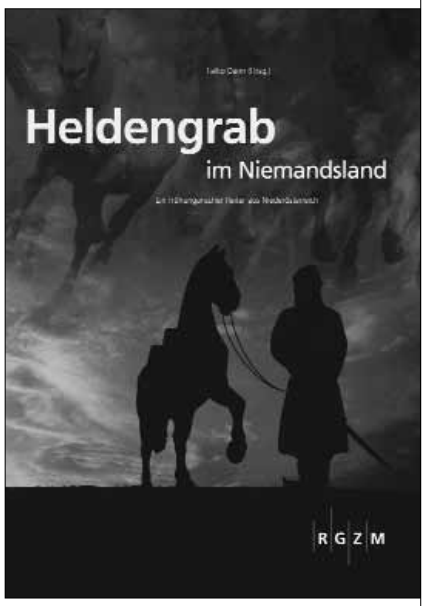
Falko Daim · Ernst Lauermann (Hrsg.)

Das frühungarische Reitergrab von Gnadendorf (Niederösterreich)

Das Reitergrab von Gnadendorf ist aus verschiedenen Gründen außergewöhnlich. Zunächst wurde es außerhalb des damaligen ungarischen Siedlungsgebietes angelegt, weiters handelt es sich bei dem Bestatteten um einen 14-jährigen, kampferfahrenen Jungen, und drittens verfügt das Grab über eine vorzügliche Ausstattung. Das Grab wirft einige grundlegende Fragen auf, denn sämtliche Fundgegenstände scheinen lange in Gebrauch gewesen zu sein. Außerdem haben zwei ^{14}C-Datierungen einen Bestattungszeitpunkt erst um das Jahr 1000 ergeben. Treffen die naturwissenschaftlichen Datierungen zu, stellt sich die Frage, warum man den Knaben weit weg von den ungarischen Siedlungen mit wertvollen, aber teils sehr alten Sachen bestattet hat. Bedenkt man, dass der ungarische Stämmebund um die Jahrtausendwende die Umstrukturierung zu einem »modernen« mittelalterlichen Staat auf christlichen Grundlagen erlebte, könnte es sein, dass die Bestattung von Gnadendorf als Demonstration gegen diese Veränderung gedacht war.
Das vorliegende Buch enthält neben einer detaillierten Fundvorlage zahlreiche Studien, die »den Fall Gnadendorf« aus unterschiedlichen Perspektiven beleuchten.



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Falko Daim (Hrsg.)

Heldengrab im Niemandsland

Ein frühungarischer Reiter aus Niederösterreich

»Heldengrab im Niemandsland« erscheint anlässlich der gleichnamigen Kabinettausstellung des RGZM im Kurfürstlichen Schloß Mainz (14. September bis 19. November 2006). Das aufwändig ausgestattete Werk fasst in mehreren Beiträgen die Forschungsergebnisse zum Grab von Gnadendorf sowie zum historisch-archäologischen Umfeld zusammen. Ein umfassender Artikel von Mechthild Schulze-Dörrlamm thematisiert darüber hinausgehend die archäologischen Belege für die frühungarischen Raubzüge in der ersten Hälfte des 10. Jahrhunderts. Die lange Zeit fast unbesiegbaren Reiter gelangten bis nach Oberitalien, an die Atlantikküste und die heutige dänische Grenze, bis sie 955 vom Heeresaufgebot König Ottos I. bei Augsburg vernichtend geschlagen werden konnten.

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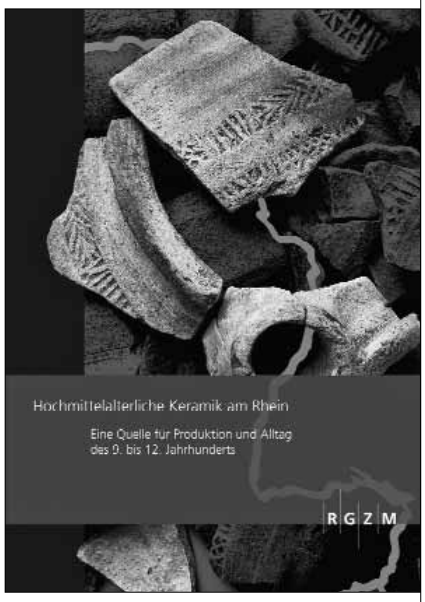

RGZM – Tagungen, Band 13
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Lutz Grunwald · Heidi Pantermehl · Rainer Schreg (Hrsg.)

Hochmittelalterliche Keramik am Rhein

Eine Quelle für Produktion und Alltag des 9. bis 12. Jahrhunderts

Durch die Tagung »Hochmittelalterliche Keramik am Rhein« gelang es, für das 9. bis 12. Jahrhundert eine Bilanz des derzeitigen Forschungsstands zu diesem »Leitfossil« der archäologischen Wissenschaft zu ziehen. Der vorliegende Band bietet mit seinen 21 Beiträgen nicht nur einen wichtigen Überblick über den aktuellen Forschungsstand zur entlang des Rheins anzutreffenden hochmittelalterlichen Keramik. Ausgehend von den unterschiedlichsten, in der Schweiz, Frankreich, Deutschland und den Niederlanden angesiedelten Forschungsvorhaben erweitert er darüber hinaus den Blick von einzelnen Fundstellen und Töpferregionen auf überregionale Betrachtungen und Zusammenhänge hinsichtlich der Warenarten, ihrer Produktion und des Handels mit keramischen Gütern. Einige Beiträge liefern für bestimmte Regionen am Rhein zudem erstmals eine Beschreibung der dort in dieser Zeit vorhandenen Tonwaren. In der Zusammenschau der Einzeldarstellungen ergeben sich neue Einblicke sowohl in die regionale Wirtschaftsgeschichte als auch in die großräumigen Entwicklungstendenzen, die in dieser Epoche das Leben und den Alltag der Menschen entlang des Rheins prägten.

Monographien des RGZM, Band 80,1-2
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Hajanalka Herold

Zillingtal (Burgenland)

Die Awarenzeitliche Siedlung und die Keramikfunde des Gräberfeldes

Die Bearbeitung der frühmittelalterlichen Siedlung (7.-8. Jahrhundert n. Chr.) sowie der Keramikfunde des zugehörigen Gräberfeldes konzentriert sich auf drei Schwerpunkte: awarenzeitliche Siedlungsbefunde und Siedlungsstrukturen im Karpatenbecken, Keramikproduktion und Keramikgebrauch in der Awarenzeit sowie awarenzeitliche Traditionen in Zillingtal bei der Beigabe von Keramikgefäßen ins Grab.
Bei den Siedlungsbefunden interessiert vor allem die frühmittelalterliche Wiederverwendung der römischen Ruinen. Die Auswertung des Fundmaterials konzentriert sich auf die Keramikfunde, mit denen zusammen auch die Keramikgefäße des awarenzeitlichen Gräberfeldes untersucht werden. Dazu dienen archäologische und archäometrische Analysen sowie Methoden der experimentellen Archäologie. Die gewonnene Chronologie der Grabgefäße und die anthropologischen Daten der Bestatteten bilden die Basis für die Analyse der awarenzeitlichen Traditionen bei der Beigabe von Keramikgefäßen in die Gräber.

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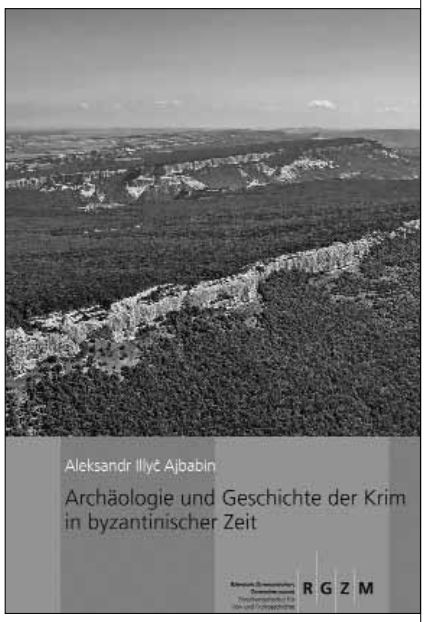
Ljudmila Pekarska

Jewellery of Princely Kiev

The Kiev Hoards in the British Museum and The Metropolitan Museum of Art and Related Material

In the capital of Kievan Rus', princely Kiev, almost 70 medieval hoards have been discovered to date. The hoards contained gold and silver jewellery of the ruling dynasty, nobility and the Christian Church. They were unique to Kiev and their quantity and magnificence of style cannot be matched by anything found either in any other former city of Rus', or in Byzantium. Most of the objects never had been published outside the former Soviet Union.
During the 17th-20th centuries, many medieval hoards were gradually unearthed; some disappeared soon after they were found. This book provides a complete picture of the three largest medieval hoards discovered in Kiev: in 1906, 1842 and 1824, and traces the history and whereabouts of other lost treasures. Other treasures took pride of place in some of the world's top museums.
This publication highlights the splendid heritage of medieval Kievan jewellery. It illustrates not only the high level of art and jewellery craftsmanship in the capital, but also the extraordinary religious, political, cultural and social development of Kievan Rus', the largest and most powerful East Slavic state in medieval Europe.



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72,– €

Aleksandr I. Ajbabin

Archäologie und Geschichte der Krim im Frühmittelalter

Obwohl die Archäologie und Geschichte der byzantinischen Krim ein gut untersuchtes Thema ist, wurden die Forschungsergebnisse jenseits des russischen Sprachraums nur schwach rezipiert.
Die hier vorgelegte Monographie des international renommierten Archäologen Aleksandr I. Ajbabin, die aus einem gemeinsamen Projekt des RGZM und der Ukrainischen Akademie der Wissenschaften hervorgegangen ist, soll dabei helfen, diesen wesentlich vom Spannungsverhältnis von Steppenvölkern und Byzantinischem Reich geprägten Raum neu und verstärkt wahrzunehmen.
Die gründlich überarbeitete und erweiterte Übersetzung des erstmals 1999 in russischer Sprache erschienenen Werkes präsentiert dem deutschen Publikum eine umfassende Übersicht über das teilweise schwer zugänglich publizierte Fundmaterial und seine Chronologie.

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